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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/054,728
Filing Date: October 25, 2001
Appellants: FAGNANI ET AL.

James J. Schumann
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed February 21, 2008, appealing from the Office action mailed September 24, 2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The Examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The Appellants' statement of the status of amendments after final rejection contained in the brief is correct.

The summary of claimed subject matter contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The Appellants' statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,624,711	SUNDBERG *et al.*	4-1997
5,169,720	BRAATZ *et al.*	12-1992
6,406,921 B1	WAGNER *et al.*	6-2002

(9) Grounds of Rejection

The following grounds of rejection are applicable to the appealed claims.

9.1 *Claims 1, 3, 5-7, 9, 10, 17, 18, 31-35, 43 and 46 are rejected for containing new matter*:

Claims 1, 3, 5-7, 9, 10, 17, 18, 31-35, 43, and 46, are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement, because the claims contain new matter. The claims contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. Specifically, the claims have the limitation "flat top" which is neither supported literally in the specification, or adequately by way of example.

9.2 *Claims 1, 3, 5-7, 9, 10, 17, 18, 31-35, and 46 are rejected as being obvious over Sundberg in view of Braatz*:

Sundberg discloses derivatized supports with an array of ligands (see e.g. Abstract; col. 1, lines 6-14 and 64-67; col. 2, lines 15-37). The derivatized supports comprise a polymer-coated support (refers to instant claimed solid substrate) and an array of ligands such as peptides (refers to instant claimed binding entity/protein binding entities and instant claim 9)(see e.g. col. 5, lines 25-35; col. 5, line 66 thru col. 6, line 10; col. 6, lines 18-35; col. 13, lines 46-52). The polymer-coated support comprises a polymer films that provide a porous three-dimensional matrix functionalized with reactive groups, and greater solvent compatibility and flexibility of the

reaction site for attachment (see e.g. col. 13, lines 49-60). Accordingly, the polymer compositions of Sundberg fall within the scope of the instant claimed hydrogel since the definition of hydrogel in the instant specification includes a broad class of polymer matrixes (see instant specification pg. 10, lines 16-18, as well as lines 21-23). The support's surface comprises a diverse array of ligands is produced on the substrate wherein the ligands include polypeptides (refers to instant claimed different binding entity/protein) and predefined regions such as wells to physically separate synthesis regions for different polymers (refers to instant claimed 'discrete locations')(see e.g. col. 5, line 66 thru col. 6, line 10; col. 6, lines 18-35; col. 11, lines 20-27)(see e.g. col. 5, lines 36-48; col. 6, lines 56-59; col. 9, lines 43-53). The polymer coating includes polyurethanes or polyethylene glycol and isocyanate functional group for the attachment of the ligands (refers to instant claimed isocyanate-functional polymer/urethane linkages, and instant claims 2, 3, 10, 17, and 32)(see e.g. col. 5, lines 25-35; col. 11, lines 59-62). In addition, the ligands can attach to the derivatized supports through a linking molecule (refers to instant claim 10)(see e.g. col. 12, lines 5-16; col. 12, lines 38-41). Regarding the thickness of the gel, Sundberg states:

> "In this case, the thickness of the resulting gel is equivalent to that of the spacers used (***13 or 50 microns***)."

Sundberg, col. 25, lines 39 and 40 (emphasis added).

The supports of Sundberg differ from the presently claimed invention not reciting a polymer comprising an isocyanate-capped polyurethane prepolymer and the polyethylene glycol having a molecular weight of at least about 5000.

Braatz discloses polymer-coated devices (see e.g. Abstract; col. 2, lines 46-64; col. 3, lines 20-32). The polymer coatings comprise isocyanate end-capped prepolymer oxyethylene based diols or glycols (see e.g. col. 2, lines 46-64; col. 3, lines 20-32; col. 3, line 43 thru col. 4, line 44). The molecular weight of the oxyethylene based diols or glycols range from 7000 to 30,000 (col. 3, line 43 thru col. 4, line 44; col. 15, line 65 thru col. 16, line 37). The isocyanate include compounds such as toluene diisocyanate (see e.g. col. 5, lines 3-21). The polymer coatings are transparent and coated onto a substrate (col. 11, lines 30-34; col. 11, line 64 thru col. 12, line 19). In addition, Braatz et al. disclose that the thickness of the polymer coatings depend on the prepolymer concentration such that the thickness of the polymer coatings substrate would

constitute obvious variations in parameters which are routinely modified in the art (see e.g. col. 9, lines 48-59). Thus, the claimed thickness of claims 4, 5, and 33 would be a choice of experimental design and is considered within the purview of the cited prior art of Braatz.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to include a polymer comprising an isocyanate-capped polyurethane prepolymer and the hydrogel having a molecular weight of at least about 5000 as taught by Braatz with the gel matrix of Sundberg. One of ordinary skill in the art would have been motivated to include a polymer comprising an isocyanate-capped polyurethane prepolymer and the hydrogel having a molecular weight of at least about 5000 in the supports of Sundberg for the advantage of providing a class of hydrated polymers for which ease of preparation and handling is combined with desirable properties (*e.g.*, reduced protein adsorption/biofouling, as explained by Braatz) permitting a wide range of end uses (Braatz: col. 2, lines 65-68) since both Sundberg and Braatz disclose a support comprises coated polymers with hydroxyl functional group such as polyethylene glycol (Sundberg: col. 15, lines 21-25; Braatz: col. 4, lines 16-22). In addition, Sundberg discloses that surfaces can be designed and prepared for optimum properties in a particular assay (Sundberg: col. 14, lines 2-6) and as a result the type of polymer use would be a choice of experimental design and is considered within the purview of the cited prior art. Furthermore, one of ordinary skill in the art would have a reasonable expectation of success in the combination of Sundberg et al. and Braatz et al. because Braatz et al. disclosed by example the success of coating surfaces with a polymer comprising an isocyanate-capped polyurethane prepolymer (Braatz: col. 19, line 47 thru col. 20, line54).

Therefore, the combined teachings of Sundberg and Braatz render the product of the instant claims *prima facie* obvious.

9.3 *Claims 1, 3, 5-7, 9, 10, 17, 18, 31-35, 41-43 and 46, are rejected as being obvious over Wagner in view of Braatz, and further in view of Sundberg*:

The rejection of claims 1, 3, 5-7, 9, 10, 17, 18, 31-35, 41-43 and 46, are rejected under 35 U.S.C. 103(a) as being unpatentable over Wagner et al. (US Patent 6,406,921) and Braatz et al.

(US Patent 5,169,720), and in further view of Sundberg *et al.* (US Patent 5,624,711), is maintained in modified form.

Contrary to Applicants' allegations, Wagner does disclose an array of proteins comprising a plurality of patches in discrete, known regions on a substrate, where the protein has different, known sequence is immobilized on each patch and the method of making an array of protein capture agents (see e.g. Abstract; col. 3, lines 26-29; col. 3, lines 44-47; col. 3, lines 56-58; col. 6, lines 45-52; col. 7, lines 17-19; col. 8, lines 10-17). The array comprises of a monolayer (refers to instant claimed hydrogel) on the surface of the substrate and the proteins are immobilized on the monolayer (see e.g. col. 8, lines 10-17; col. 11, lines 15-28 and 39-53). The monolayer comprises the formula of X-R-Y wherein X is the functional group that binds to the surface of the substrate, R is a hydrocarbon chain with the hetero groups such as –(OCH2CH2)n- with n =1-20, and Y is the functional group that binds to the protein such as isocyanate (see e.g. col. 8, lines 10-17; col. 10, lines 10-26; col. 11, lines 15-28 and 39-53). Moreover regarding the claimed thickness of the hydrogel (claims 4, 5, and 37), the thickness of the hydrogel would be a choice of experimental design and is considered within the purview of the cited prior art since Wagner et al. disclose that the monolayer can be of any thickness on the substrate (see e.g. col. 5, lines 15-26). Additionally, the protein can be attached to the Y functional group via an affinity tag (refers to instant claimed intermediate agent) or a reagent such as nitrilotriacetic acid (refers to instant claim 43)(see e.g. col. 11, lines 15-28; col. 11, lines 39-46; col. 12, line 59 thru col. 13, line 12). The type of protein includes enzyme and antibodies (see e.g. col. 7, lines 34-47). The substrate comprise patterned such as walls (see e.g. col. 9, lines 55-64).

The support of Wagner differs from the presently claimed invention by failing to a polymer comprising an isocyanate-capped polyurethane prepolymer.

Braatz discloses polymer-coated devices (see e.g. Abstract; col. 2, lines 46-64; col. 3, lines 20-32). The polymer coatings comprise isocyanate end-capped prepolymer oxyethylene based diols or glycols (see e.g. col. 2, lines 46-64; col. 3, lines 20-32; col. 3, line 43 thru col. 4, line 44). The molecular weight of the oxyethylene based diols or glycols range from 7000 to 30,000 (col. 3, line 43 thru col. 4, line 44; col. 15, line 65 thru col. 16, line 37). The isocyanate include compounds such as toluene diisocyanate (see e.g. col. 5, lines 3-21). The polymer coatings are transparent and coated onto a substrate (col. 11, lines 30-34; col. 11, line 64 thru col.

12, line 19). In addition, Braatz disclose that the thickness of the polymer coatings depend on the prepolymer concentration such that the thickness of the polymer coatings substrate would constitute obvious variations in parameters which are routinely modified in the art (see e.g. col. 9, lines 48-59). Thus, the claimed thickness of claims 4, 5, and 33 would be a choice of experimental design and is considered within the purview of the cited prior art of Braatz.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to provide a polymer comprising an isocyanate-capped polyurethane prepolymer as taught by Braatz in view of Wagner. One of ordinary skill in the art would have been motivated to a polymer comprising an isocyanate-capped polyurethane prepolymer in the support of Wagner for the advantage of providing a class of hydrated polymers for which ease of preparation and handling is combined with desirable properties permitting a wide range of end uses (Braatz: col. 2, lines 65-68) since both Wagner and Braatz disclose a support comprises coated polymers with hydroxyl functional group such as polyethylene glycol (Wagner: col. 12, lines 31-38; Braatz: col. 4, lines 16-22). In addition, Wagner disclose that there are many possible design choices with regard to the type of coating on the substrate (Wagner: col. 8, lines 34-38) and as a result the type of polymer use would be a choice of experimental design and is considered within the purview of the cited prior art (see Sundberg). Furthermore, one of ordinary skill in the art would have a reasonable expectation of success in the combination of Wagner and Braatz because Braatz disclosed by example the success of coating surfaces with a polymer comprising an isocyanate-capped polyurethane prepolymer (Braatz: col. 19, line 47 thru col. 20, line 54).

Therefore, the combined teachings of Wagner and Braatz render the product of the instant claims *prima facie* obvious.

(10) Response to Argument

10.1 *The rejection of the claims for having new matter*:

Appellants argue that the new matter rejection is improper, and believe that the basis of the rejection is simply directed towards the use of the limitation "flat". Appellants are further of the opinion that the original claim 18 provides adequate support for a "flat top surface," by the

recitation of the phrase "a solid substrate having a top surface." Appellants further suggest that it is common knowledge that glass slides all have flat top surfaces.

Instead, the specification describes that "flat plates" such as glass slides, are used for the Appellants invention (paragraph 0063), or generally describes that it is the "top" of a solid substrate that is used for binding the hydrogel (paragraphs 0008, 0030; original claims 17, 18, 23 and 28). There simply is no recitation or suggestion of a biochip having a "flat top surface" wherein the cells protrude from the "otherwise flat top surface."

And although 35 U.S.C. § 112, first paragraph does not necessarily require a literal recitation of the claim elements, it is not permissible to carve out an undisclosed or suggested embodiment that changes the scope of claims from what was originally disclosed. See, e.g., *PIN/NIP, Inc. v. Platte Chem. Co.*, 304 F.3d 1235, 1248, 64 USPQ2d 1344, 1353 (Fed. Cir. 2002) (Claim for a method of inhibiting sprout growth on tubers by treating them with spaced, sequential application of two chemicals was held invalid for lack of adequate written description where the specification indicated that invention was a method of applying a "composition," or mixture, of the two chemicals.); *Gentry Gallery, Inc. v. Berkline Corp.*, 134 F.3d 1473, 45 USPQ2d 1498 (Fed. Cir. 1998) (claims to a sectional sofa comprising, inter alia, a console and a control means were held invalid for failing to satisfy the written description requirement where the claims were broadened by removing the location of the control means);

In the instant case, the specification while supporting glass slides as a substrates for the hydrogel, the use of flat plates, and substrates having a top surface, does not support the claimed species. The specification suggests that when there are wells or depressions on the plate, that the hydrogels are held by such features. Or, the specification suggests flat plates such as glass slides hold the hydrogel cells (*e.g.*, planar substrates). However, the specification does not suggest the claimed combination. For example, a substrate having a "flat surface" region which is the top of the substrate, as well as non-flat features going into the substrate, such as depressions or wells, but the claimed hydrogel being attached to the flat and top portion of the surface, but not within the depressions or wells (compare to paragraph 0063).

The rejection is maintained.

10.2 *The rejection of the claims as being obvious over Sundberg and Braatz*:

Appellants begin their traversal of the rejection primarily by focusing on certain select disclosures of Sundberg, and give little, if any consideration to the suggested breadth taught by Sundberg. Appellants argue that Sundberg is primarily concerned with polymer films that are not hydrogels, and assert that in the instances where Sundberg discloses certain polymer matrix gels prepared with water (*e.g.*, polyacrylamide), that the gels are not the same as Appellants' hydrogels (Brief, page 10).

Appellants continue to counter the rejection by asserting that the proper definition of a hydrogels is:

> "Hydrogels are hydrophilic network polymers which are glassy in the dehydrated state and swell in the presence of water to form an elastic gel."

Brief, page 11, quoted from the specification, page 10, lines 16-18.

Appellants also suggest that the definition of what constitutes a hydrogel is further illustrated by the internet encyclopedia, Wikipedia, and surmise their own reading in the interpretation as "a network of polymer chains that are water insoluble and superabsorbent (they can contain over 99% water) natural or synthetic polymer" (Brief, at page 11, lines 10-11).

The Federal Circuit has repeatedly stated that the words of a claim "are generally given their ordinary and customary meaning." Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582 (Fed. Cir. 1996); *see also Toro Co. v. White Consol. Indus., Inc.*, 199 F.3d 1295, 1299 (Fed. Cir. 1999); *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998). The ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention at the time of filing (*see Innova/Pure Water, Inc. v. Safari Water Filtration Systems, Inc.*, 381 F.3d 1111, 1116 (Fed. Cir. 2004)). "A court construing a patent claim seeks to accord a claim the meaning it would have to a person of ordinary skill in the art at the time of the invention" *Home Diagnostics, Inc. v. LifeScan, Inc.*, 381 F.3d 1352, 1358, Fed. Cir. 2004. "[C]ustomary meaning" refers to the "customary meaning in [the] art field" (*Ferguson Beauregard/Logic Controls v. Mega Sys., LLC*, 350 F.3d 1327, 1338 (Fed. Cir. 2003)).

In the absence of a limitation having a plain and customary meaning, and/or in situations of arguable meaning, the person of ordinary skill reads the claim term not only in the context of the particular claim, but in the context of the entire patent, including the specification:

> "It is the person of ordinary skill in the field of the invention through whose eyes the claims are construed. Such person is deemed to read the words used in the patent documents with an understanding of their meaning in the field, and to have knowledge of any special meaning and usage in the field. The inventor's words that are used to describe the invention—the inventor's lexicography—must be understood and interpreted by the court as they would be understood and interpreted by a person in that field of technology. Thus the court starts the decision making process by reviewing the same resources as would that person, viz., the patent specification and the prosecution history."

Multiform Desiccants, Inc. v. Medzam, Ltd., 133 F.3d 1473, 1477 (Fed. Cir. 1998).

Regarding claim construction, the courts have on more than one occasion made it clear that intrinsic evidence, such as Applicants' disclosure, must be considered. *Medrad, Inc. v. MRI Devices Corp.*, 401 F.3d 1313, 1319 (Fed. Cir. 2005), wherein the court stated: "[w]e cannot look at the ordinary meaning of the term . . . in a vacuum. Rather, we must look at the ordinary meaning in the context of the written description and the prosecution history." *See also, V-Formation, Inc. v. Benetton Group SpA*, 401 F.3d 1307, 1310 (Fed. Cir. 2005), wherein the intrinsic record "usually provides the technological and temporal context to enable the court to ascertain the meaning of the claim to one of ordinary skill in the art at the time of the invention." *See also, Unitherm Food Sys., Inc. v. Swift-Eckrich, Inc.*, 375 F.3d 1341, 1351 (Fed. Cir. 2004), wherein that the proper definition is the "definition that one of ordinary skill in the art could ascertain from the intrinsic evidence in the record."

In fact, the Federal Circuit has on multiple instances indicated that the specification is usually the "single best guide to the meaning of a disputed term." *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582-85 (Fed. Cir. 1996). See also, *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 977 (Fed. Cir. 1995), and *Phillips v. AWH Corp.*, 415 F.3D 1303 (Fed. Cir. 2005).

Contrary to Appellants arguments, the definition in the specification is relatively broad as applied to the term hydrogel, and does not require a percentage of water in the matrix, just that polymer have the ability to absorb water, and be glassy in the dehydrated state:

> "***Hydrogels are a class of polymers that can provide a gel matrix*** that *preferably has adequate pore size and high water content* to permit diffusion of molecules in and out of the matrix, an ability to bind to the surface of a glass or the like, sufficient optical transparency in a fully polymerized state to minimize any optical interference with fluorescent tags, good structural integrity when fully polymerized, and adequate shelf life for normal research and clinical use. ***Hydrogels are hydrophilic network polymers which are glassy in the dehydrated state and swell in the presence of water to form an elastic gel***."

Specification, page 10, lines 6-15 (emphasis added).

The polymers exemplified and suggested by Sundberg are in fact hydrogels, and meet the requirements of being the form of a hydrogel as required by the claim. For example, Appellants claim the following in claim 1[1]:

> "b) a plurality of optically clear, individual, three-dimensional hydrogel cells at least 20 μm thick attached to the flat surface of the substrate at discrete locations to form an array of discrete individual three-dimensional cells protruding from said otherwise flat top surface,..."

Claim 1, first part of part (b).

Compare to the following teachings in Sundberg where the hydrogel polymer and its arrangement on the substrate are explained:

> "Additionally, the degree of polymer crosslinking can be varied to ***produce films which are optically transparent and of uniform thickness***."

Sundberg, col. 15, lines 46-48 (emphasis added); and:

> "Although in some embodiments it may be desirable to ***physically separate synthesis regions*** for different polymers with, for example, wells, raised regions, etched trenches, or the like. In some embodiments, the

[1] Regarding the flat top limitation, Sundberg states: "Substrate: As used herein, the term "substrate" or "support" refers to a material having a rigid or semi-rigid surface. In many embodiments, at least one surface of the substrate will be substantially flat..." (col. 5, line 66 through col. 6, line 2); and also, "The solid substrate may be biological, nonbiological, organic, inorganic, or a combination of any of these, existing as particles, strands, precipitates, ***gels***, sheets, tubing, spheres, containers, capillaries, pads, slices, films, plates, slides, etc. The solid substrate is preferably flat but may take on alternative surface configurations." (col. 11, lines 20-25, emphasis added).

> substrate itself contains wells, trenches, flow through regions, etc. which form all or part of the synthesis regions. According to other embodiments, small beads may be provided on the surface, and compounds synthesized thereon may be released upon completion of the synthesis."

Sundberg, col. 6, lines 3-10 (emphasis added); and:

> For example, the substrate may be a polymerized Langmuir Blodgett film, functionalized glass, Si, Ge, GaAs, GaP, SiO_2, SiN_4, modified silicon, ***or any one of a variety of gels or polymers*** such as (poly)tetrafluoroethylene, (poly)vinylidendifluoride, polystyrene, polycarbonate, or combinations thereof."

Sundberg, col. 11, lines 29-34 (emphasis added); and:

> "In this case, the ***thickness of the resulting gel*** is equivalent to that of the spacers used (***13 or 50 microns***)"

Sundberg, col. 25, lines 39-40 (emphasis added).

The final section of part (b) in claim 1 sets forth:

> "which hydrogel cells are formed from an isocyanate-functional prepolymer with urethane linkages"

Claim 1, part (b).

Sundberg, while not explicitly teaching the "isocyantate-functional prepolymers with urethane linkages," does teach polyurethane polymers as the basis for the gel pads:

> "In certain embodiments of the invention, polymer-coated supports are described. The ***polymers used for coating a solid support include***, but are not limited to ***polyurethanes***, polyesters, poly-carbonates, polyureas, polyamides, polyethylene-imines, polyarylene sulfides, polysiloxanes, poly-acrylamides, polyimides, polyacetates, or other polymers which will be apparent upon review of this disclosure."

Sundberg, col. 5, lines 25-31 (emphasis added).

However, even if we are to assume that the gels taught Sundberg are not recognized as "hydrogels," it is apparent from Braatz that gels that are considered "hydrogels" are well-recognized substrates for biological applications, especially polyurethane polymers:

> "Numerous polyurethane polymers have been previously identified, among them both foamed and nonfoamed materials. Of the nonfoamed materials, quite a few hydrogel polymers, prepared from various prepolymers, have been prepared and used for widely varying

> applications. Typically, hydrogels are formed by polymerizing a hydrophilic monomer in an aqueous solution under conditions such that the prepolymer becomes crosslinked, forming a three-dimensional polymeric network which gels the solution. ***Polyurethane hydrogels are formed by polymerization of isocyanate-end capped prepolymers to create urea and urethane linkages***."

Braatz, col. 1, lines 32-44 (emphasis added); and:

> "Numerous ***polyurethane polymers*** have been previously identified, among them both foamed and nonfoamed materials. Of the nonfoamed materials, quite a few hydrogel polymers, prepared from various prepolymers, have been prepared and used for widely varying applications. ***Typically, hydrogels are formed by polymerizing a hydrophilic monomer in an aqueous solution under conditions such that the prepolymer becomes crosslinked, forming a three-dimensional polymeric network which gels the solution***. Polyurethane hydrogels are formed by polymerization of isocyanate-end capped prepolymers to create urea and urethane linkages."

Braatz, col. 1, lines 32-44 (emphasis added); and:

> "The resulting polymers take the form of a dense or thin coating or impregnant on a substrate, including, under dilute conditions, a monomolecular or substantially monomolecular layer. ***The coatings and impregnates of this invention are considered gels or hydrogels*** and are included by those terms unless otherwise noted. The terms gel or hydrogel are meant to refer to polymers which are non-foamed in structure."

Braatz, col. 2, lines 56-64 (emphasis added); and:

> "A new class of ***hydrophilic polyurea-urethane prepolymers and related crosslinked hydrated polymer gels has been found which are uniquely characterized by biocompatibility and resistance to nonspecific protein adsorption*** and which can be coated onto medical and laboratory devices for purposes of conferring those characteristics on the devices. The hydrated polymers are formed from polymeric monomer units (the prepolymer units) at least 75% of which are oxyethylene-based diols or polyols having ***molecular weights of about 7000 to about 30,000***, with essentially all of the hydroxyl groups of these diols or polyols capped with polyisocyanate."

Braatz, col. 3, lines 20-32 (emphasis added).

Braatz also teaches that such polymer hydrogels have many applications, and includes coating substrates for assay uses similar to those in Sundberg:

> "Other medical devices may be coated, as may various types of labware which is used in conjunction with tissue or cell cultures, protein-containing fluids such as blood or serum, or the like. ***This would include, but not be limited to, assay plates, supports or membranes***, glassware, cell culture or bioreactor devices or assemblies,..."

Braatz, col. 11, line 64 through col. 12, line 2 (emphasis added).

Appellants continue to suggest that the rejection is improper because it is alleged that the rejection is "born of hindsight," and that Braatz teaches away from the purposes of Sundberg (Brief, paragraph bridging pages 11 and 12).

Such assertions are simply incorrect. Although Sundberg does not directly teach gels having the physicochemical properties such as Braatz (*i.e.*, reduced biofouling and/or protein adsorption), such an omission does not render the two teachings as opposing disclosures. Besides, Sundberg does not rely on adsorbing peptides or proteins to his hydrogel array as suggested by Appellants (page 12, lines 10-11); Sundberg does however exemplify covalent attachment of oligonucleotides to the sites of the gel using a light directed synthesis approach (see Example 7 where VSLIPS™ synthesis is disclosed). One of ordinary skill in the art would appreciate that Sundberg's arrays would benefit from reduced adsorption of protein contaminates in a biological sample, as taught by Braatz, when analyzing for target oligonucleotides in Sundberg's hybridization assays. Appellants' arguments fail to consider the art as a whole from the perspective of the person of ordinary skill.

Part (c) of claim 1 is set forth as follows (with emphasis):

> c) a different binding entity immobilized within or upon various of said hydrogel cells by covalent linkage of said binding entity ***or an intermediate agent with reactive isocyanate groups*** of said hydrogel, which entity is effective to selectively hybridize to or sequester a target molecule.

Regarding this part of the claim, Appellants argue that the combination of Sundberg and Braatz is also not combinable because the chemical groups that each reference utilizes (Brief, page 12). However, this argument is also not persuasive.

Sundberg clearly recognizes the balance of protecting groups and reactive groups, and teaches a number of possible groups from which to chose from for chemical modification of the base substrate or gel:

> "The present invention relates to the field of solid phase polymer synthesis. More specifically, the invention provides methods and ***derivatized supports which find application in solid phase synthesis of oligomer arrays*** or of single compounds on a preparative scale. The oligomer arrays which are prepared using the derivatized supports of the present invention may be used, for example, in screening studies for determination of binding affinity and in diagnostic applications."

Sundberg, col. 1, lines 6-15 (emphasis added); and:

> "Typically, the linking molecules will be aryl acetylene, ethylene glycol oligomers containing 2-14 monomer units, diamines, diacids, amino acids, peptides, or combinations thereof…For example, ***groups appropriate for attachment*** to the derivatized surface would include amino, hydroxy, thiol, carboxylic acid, ester, amide, ***isocyanate*** and isothiocyanate. ***Additionally, for subsequent use in synthesis of polymer arrays or libraries, the linking molecules used herein will typically have a protecting group attached to the functional group on the distal or terminal end of the linking molecule*** (opposite the solid support)."

Sundberg, col. 12, lines 26-46 (emphasis added).

Accordingly, one of ordinary skill in the art would have recognized that isocyanate prepolymers/hydrogel strategy of Braatz, in view of the isocyante groups by Sundberg, provide the means for linking biological components, and attachment for various linking moieties (regardless of their elimination, which is consistent the way in which urethanes are formed; i.e., R_1-N=C=O to R_1-N-C(O)O-R_2). The claim does not require direct attachment, but reads on "an intermediate agent" that reacts with the isocyanate groups in the prepolymer reagent, such as the linkers in Sundberg.

Appellants further allege that limitation in claim 3, "wherein the hydrogel comprisies polyethylene glycol, polypropylene glycol, or copolymers thereof having a molecular weight of about 5000" is not met by either Sundberg or Braatz. Appellants' arguments for claim 32 are similar.

However, it is quite clear that Braatz does in fact teach these polymers and these approximate molecular weight ranges. Braatz states:

> "A new class of hydrophilic polyurea-urethane prepolymers and related crosslinked hydrated polymer gels has been found which are uniquely characterized by biocompatibility and resistance to nonspecific protein adsorption and which can be coated onto medical and laboratory devices for purposes of conferring those characteristics on the devices. The hydrated polymers are formed from polymeric monomer units (the prepolymer units) at least 75% of which are oxyethylene-based diols or polyols having molecular weights of ***about 7000 to about 30,000***, with essentially all of the hydroxyl groups of these diols or polyols capped with polyisocyanate."

Braatz, col. 3, lines 20-32 (emphasis added).

Furthermore, one of ordinary skill in the art would not find there to be any unexpected results in going from "about 7,000 to 30,000," as suggested by Braatz to the claimed "about 5000." Such understandings are supported by decisions from the Federal Circuit, which have stated that "where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which was performed at a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be prima facie obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100°C and an acid concentration of 10%.); see also Peterson, 315 F.3d at 1330, 65 USPQ2d at 1382 ("The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages."); *In re Hoeschele*, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969) (Claimed elastomeric polyurethanes which fell within the broad scope of the references were held to be unpatentable thereover because, among other reasons, there was no evidence of the criticality of the claimed ranges of molecular weight or molar proportions.).

The rejection is therefore proper, and is maintained.

10.3 *The rejection of the claims as being obvious over Sundberg and Braatz*:

Appellants argue that the rejection is improper, for at least the reasons provided with regard to the previous rejections. Appellants allege that Wagner is also improper in combination

with Sundberg and Braatz, and point to certain select teachings that do not fairly characterize the art as a whole.

The rebuttal to Appellants' arguments regarding Sundberg and Braatz can be obtained in the Examiner's response above. Regarding Wagner, it is of little relevance that Wagner utilizes a thin films and monolayer polymer coatings for protein attachment, because such strategies are compatible and well-known with the polyethylene glycol polymers set forth in Sundberg and Braatz. Wagner teaches certain reaction chemistries for chemical modification and protein attachment with polyethylene glycol polymers that are required by the claims (*e.g.*, claim 43 and nitrilotriacetic acid; see Wagner col. 11, lines 15-52). Accordingly, Wagner is an appropriate reference that clearly illustrates that bioarrays for assay purposes based on polyethylene chemistries, and having isocyanate functional groups may utilize a chemical group such as nitrilotriacetic acid as an intermediate en route to preparing a gel-based substrate such as Sundberg, made from an isocyanate-functional prepolymer with urethane linkages as shown by Braatz.

Regarding Appellants' arguments to claims 3 and 32, these limitations are met by Braatz (refer to the Examiner's arguments above).

The rejection is therefore proper, and is maintained.

(11) Related Proceedings Appendix

No decision rendered by a court or the Board is identified by the Examiner in the Related Appeals and Interferences section of this Examiner's Answer.

For the above reasons, it is believed that the rejections should be retained.

Respectfully submitted,

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Conferee:

/JD Schultz, PhD/

Supervisory Patent Examiner, Art Unit 1635

Conferee:

/Ram R. Shukla/

Supervisory Patent Examiner, Art Unit 1634